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(54) **Improved safety cap for pressurised containers**

Sicherheitsverschluss für Druckbehälter

Bouchon de sécurité pour réservoir sous pression

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Description

[0001] The present invention relates to a safety cap which is used to close a container containing steam under pressure, such as, for example, the boiler of a steam generator.

[0002] European Patent No. 0 337 528 discloses a safety cap for a container containing steam under pressure, comprising a closure member screwed onto the mouth of the container, an external knob which the user can turn to screw the closure member on and off, and an internal diaphragm which is moved by the action of the pressure of the steam. When the pressure of steam in the container is zero or low, the diaphragm is in a rest position, and the closure member and knob are coupled in rotation to allow the cap to be unscrewed. As the pressure of the steam rises, the diaphragm moves into an operating position and uncouples the knob from the closure member to prevent the closure member from being unscrewed.

[0003] This safety cap therefore prevents the container from being opened when there is high steam pressure inside it and prevents the pressurized steam from escaping violently and injuring the user.

[0004] This safety cap finds advantageous application in, for example, the boilers of steam generators for domestic use, e.g. for supplying steam irons, cleaning equipment, etc. Its virtue is that the domestic user is often technically unskilled and therefore lacks the necessary awareness and understanding to handle a pressure boiler.

[0005] It is precisely because of the great danger represented by a container of steam under pressure, and the inexperience of those who usually use it, that it is so important to improve the closure cap of the container in such a way as to lower the risk margin, and hence the likelihood of accidents, towards zero.

[0006] It is an object of the present invention to provide a safety cap that satisfies this requirement.

[0007] This object is achieved by means of a safety cap of the type described above, characterized in that it comprises a manometer, incorporated in the cap and readable from the outside, which detects the pressure of steam in the container.

[0008] The invention will be understood more clearly from the following description of a non-restrictive example of an embodiment thereof, illustrated in the accompanying drawings in which:

Fig. 1 is an exploded perspective view of a safety cap according to the invention;
Fig. 2 shows two components of the cap of Fig. 1 in a different exploded perspective view;
Figs. 3, 4 are two views in longitudinal section showing how the cap of Fig. 1 works;
Fig. 5 shows in plan view how a mechanism of the cap of Fig. 1 works; and
Fig. 6 is a perspective view of the cap of Fig. 1 in the assembled state.

[0009] The cap illustrated, which is given the general reference 10, comprises a closure member 11 and a knob 12 connected to it.

[0010] The closure member 11 is internally hollow and comprises a cylindrical head 13 and an internally threaded shank 14, also cylindrical. The head 13 includes an external toothed ring 15 which fits into an internal annular throat 49 in the knob 12. On the top of the head 13 there is also a spider part 16. Inside the head 13, a cavity 17 is bounded at the bottom by an arcuate wall 18 containing an eccentric hole 19 allowing communication between the cavity and the interior of the shank 14. The cavity 17 houses an elastic diaphragm 20 which is securely attached all the way around its circumference to the walls of the cavity. The bottom end of a bush 21 rests on the diaphragm 20. Resting on the top end of the bush 21 is a disc 22 with four longitudinal teeth 23 and four radial teeth 24 around its perimeter; the longitudinal teeth 23 fit into the spaces between the arms 16' of the spider 16, while the radial teeth 24 fit into the spaces between four internal projections 25 from the knob 12.

[0011] A manometer 26 is incorporated in the knob 12. The manometer 26 comprises a base 27 which includes a downward stem 28 that passes through an axial through hole 29 in the disc 22 and into the inside 30 of the bush 21. The base 27 supports a flat, elliptically-sectioned tubular component 31 extending in an arc of a circle. One end of the tubular component 31 is connected to one end of a tube 32 of small section. The tube 32 runs down through the stem 28, passes out of the stem and then out of the bush 21 through a longitudinal slot 33 in the bush itself and enters through a transverse through hole 34 in the head 13 of the closure member 11. This hole 34 opens into the space between the wall 18 and the diaphragm 20 so that the tube 32 places this space in communication with the inside of the tubular component 31. At the opposite end from that connected to the tube 32, the tubular component 31 is connected to a rod 35 which in turn is hinged to a lever 36 integral with a sector gear 37; the sector gear 37 meshes with a pinion 38 attached to an indicator needle 39. The indicator needle 39 is mounted on a dial 40 showing a graduated scale 41 giving pressure values. The manometer 26, which weighs very little, is supported simply by resting on a horizontal length of tube 32 on the head 13 of the closure member 11 and is fixed in position by a plate 42 attached to the tube 32 and inserted in a seat 43 formed in the spider 16. The indicator needle 39 and the dial 40 lie behind a transparent wall 44 in the top of the knob 12.

[0012] The cap 10 as described and illustrated is intended to close a container in which steam is generated under pressure, e.g. the boiler of a steam generator designed for use in the home. This container of which Figs. 3 and 4 show a portion of the upper wall, marked A, in section, includes an externally threaded mouth B allow-

ing communication between the interior of the container and the outside. The cap 10 is fitted to the container by screwing the threaded shank 14 of the closure member 11 of the cap onto the mouth B. To screw the cap 10 on, the user rotates the knob 12, which transmits rotary motion to the toothed disc 22 because of the engagement of the projections 25 of the knob with the teeth 24 of the disc, and the disc 22 in turn transmits rotary motion to the closure member 11 because of the engagement of the teeth 23 with the arms 16' of the spider 16. A seal 45 is housed in the root of the shank 14 and projects radially inwards from the root to provide leaktightness between the closure member 11 and the mouth B.

[0013] Operationally, with reference to Figs. 3 and 4, when pressurized steam is generated in the container, this pressurized steam passes into the cap 10 as far as the cavity 17 upstream of the diaphragm 20 via the hole 19, and acts on one side of the diaphragm pushing it upwards as shown in Fig. 4. The upward movement of the diaphragm 20 causes an upward movement of the bush 21 and hence of the disc 22, so that the teeth 23 of the disc 22 disengage from the arms 16' of the spider 16 and the teeth 24 of the disc disengage from the projections 25 of the knob 12, the result of which is that there is no longer any connection between the closure member 11 and the knob 12. At the same time the steam enters the tube 32 through the hole 34 and reaches the hollow tubular component 31; the pressure of the steam causes the curvature of this part 31 to change and, as shown in Fig. 5, by means of the rod 35, lever 36, sector gear 37 and pinion 38, the needle 39 is caused to rotate to a point on the graduated scale 41 corresponding to the value of the pressure in the container.

[0014] In this way the operator, by simple observation of the manometer 26, and in particular the position of the needle 39, through the transparent wall 44, is made aware of the existence of pressurized steam inside the container. If, nonetheless, the operator tries to unscrew the cap 10 by turning the knob 12 in spite of the indication provided by the manometer 26, the knob will rotate loosely round the closure member 11 since it has been disconnected from the latter, thus preventing the unscrewing of the cap. In its loose rotation about the closure member 11, the knob 12 is guided by the connection between the ring 15 and the throat 49.

[0015] A transverse through hole 46 is formed in the shank 14 of the closure member 11 at an intermediate point along its length. If for any reason the user does manage to unscrew the cap 10 while there is still steam under pressure inside the container, the hole 46 will open onto the exterior before the cap is fully unscrewed and the steam under pressure will thus vent to the outside through this hole, thus warning the operator of the presence of steam under pressure in the container.

[0016] When the pressure of steam in the container drops or reaches zero, the diaphragm 20 sinks back down to its initial position as shown in Fig. 3. The bush 21 sinks with the diaphragm 20 so that the teeth 23 of the disc 22 re-engage with the arms 16' of the spider 16 and the teeth 24 of the disc re-engage with the projections 25 of the knob 12, reconnecting the knob to the closure member and thereby making it possible to unscrew the cap from the container. Should the abovementioned components not engage immediately with each other, the initial rotation of the knob 12 will be sufficient to bring such engagement about.

[0017] It will be clear from the aforegoing that the cap 10 offers valuable safety guarantees, avoiding the risk of accidents due to sudden escapes of pressurized steam from the container or, in the most serious case, explosion of the container due to excessive pressure. In particular, the combination of the manometer with the system for mechanically uncoupling the closure member from the knob gives enhanced security since the operator is first given a visual indication of the dangerous situation and, if that goes unnoticed, the operator is still protected by the mechanical uncoupling. Obviously the vent hole 46 represents yet another safety feature.

[0018] The location of the needle 39 and of the scale 41 at the top of the cap allows them to be read immediately.

[0019] The graduated scale 40 is preferably divided into two bands, namely a green-coloured band corresponding to zero pressure or low pressures in the container, followed by a red-coloured band corresponding to higher pressures in the container at values at which the container must not be opened.

[0020] It may be remarked that the high degree of safety is provided with a cap having the same dimensions as known caps of this type thanks to the compact dimensions of the manometer 26 components. The path followed by the tube 32 of the manometer 26 for collecting the pressure signal from upstream of the diaphragm 20 is particularly advantageous inasmuch as it does not obstruct the correct working of the mechanical uncoupling system; the slot 33 in the bush 21 allows the bush to move relative to the tube 32 during the movement of mutual mechanical coupling or uncoupling of the closure member 11 and knob 12.

[0021] The eccentric position of the hole 19 and the radially inward-projecting position of the seal 45 that comes partly over the hole, protect the hole from spurts of boiling water and thus prevent lime from forming in the hole and blocking it up.

[0022] The knob 12 comprises a cylindrical skirt 47 in which the internal components of the cap 10 are enclosed and which extends past the lower end of the shank 14 of the closure member 11; the knob also comprises an internal transverse annular closing wall 48 through which the shank 14 passes. The skirt 47 protects the internal components of the cap 10 and its lower end part 47' prevents anyone from getting access to the shank 14 with a tool and trying to turn the closure member 11 when the container is holding pressurized steam and the closure member 11 and knob 12 are uncoupled from each other; the wall 48 protects the underside of

the internal components of the cap and prevents access to these.

[0023] Variations and/or additions to what has been described above and illustrated are obviously possible.

[0024] The configuration both of the parts that make up the cap and of their details may vary; for instance, variations of the shape of the components and/or variations in the number of their details (arms, teeth, projections) may be envisaged.

[0025] The manometer here described and illustrated proves, as seen earlier, to be particularly advantageous. However, the use of other types of manometer must not be ruled out.

[0026] The cap here described and illustrated may obviously be applied to any container under pressure to satisfy the requirements of a high degree of safety.

Claims

1. Safety cap for a container containing steam under pressure, comprising a closure member (11) screwed on the mouth (B) of the container, an external knob (12) which the user can turn to screw the closure member (11) on and off, and an internal diaphragm (20) which is moved by the action of the pressure of the steam, the diaphragm (20) having a rest position, when the steam pressure is low or zero, in which the closure member (11) and the knob (12) are coupled in rotation through a coupling/uncoupling system (21-25) to allow the cap (10) to be unscrewed, and an operating position, when the pressure is high, which breaks said coupling through the coupling/uncoupling system (21-25) and prevents the cap (10) from being unscrewed, which cap (10) is **characterized in that** it comprises a manometer (26), incorporated in the cap and readable from the outside, which detects the pressure of steam in the container independently of the working of the diaphragm (20) and of the coupling/uncoupling system (21-25).

2. Safety cap according to Claim 1, in which the manometer (26) comprises indicator means (39-41) visible through a transparent wall (44) in the top of the cap.

3. Safety cap according to Claim 1, in which the manometer (26) comprises an arcuate flattened tubular component (31) communicating at one end with a tube (32) that picks up the pressure signal upstream of the diaphragm (20) and being connected at the other end via linkages (35-38) to an indicator needle (39) mounted on a dial (40), the tubular component (31) varying its curvature as a function of the abovementioned pressure signal and moving the indicator needle (39) correspondingly.

4. Safety cap according to Claim 3, in which the dial (40) is mounted behind a transparent wall (44) in the top of the knob (12).

5. Safety cap according to Claim 3 or 4, in which the dial (40) carries a scale with two consecutive bands, the first green and the next red, along which the indicator needle (39) moves, the green band being for zero or low pressures and the red band for higher pressures.

6. Safety cap according to Claim 1, in which the diaphragm (20) acts on an axial bush (21) on which there rests a toothed disc (22) connected rotationally by disconnectable dog connections to the closure member (11) and to the knob (12), which toothed disc (22) engages, in the rest position of the diaphragm (20), with the closure member (11) and knob (12) to couple them rotationally to each other, while in the operating position the diaphragm (20) moves the disc (22) axially into a position of disengagement from the closure member (11) and from the knob (12) to uncouple them rotationally from each other.

7. Safety cap according to Claim 3, in which the diaphragm (20) acts on an axial bush (21) on which there rests a toothed disc (22) connected rotationally by disconnectable dog connections to the closure member (11) and to the knob (12), which toothed disc (22) engages, in the rest position of the diaphragm (20), with the closure member (11) and knob (12) to couple them rotationally to each other, while in the operating position the diaphragm (20) moves the disc (22) axially into a position of disengagement from the closure member (11) and from the knob (12) to uncouple them rotationally from each other, and in which the tube (32) runs axially through a hole (29) in the disc (22) and through the inside (30) of the bush (21), passes transversely out of the bush (21) through a longitudinal slot (33) in the bush (21), and re-enters through a transverse hole (34) in the closure member (11) which opens out upstream of the diaphragm (20).

8. Cap according to Claim 1, in which the closure member (11) has a threaded shank (14) that screws onto the mouth (B) of the container and that includes a through hole (46) by way of a vent in an intermediate position.

9. Cap according to Claim 1, in which the closure member (11) is provided, upstream of the diaphragm (20), with a wall (18) containing an eccentric hole (19) for the steam to pass through, and in which the closure member (11) accommodates a seal (45) that provides leaktightness between the closure member (11) and the container mouth (B)

and that projects radially towards the middle of the mouth (B) in such a way as to come at least partly over the eccentric hole (19).

10. Cap according to Claim 1, in which the knob (12) comprises a skirt (47) that extends down at least as far as the lower end of the closure member (11), for the protection of the internal components of the cap and to render the closure member (11) laterally inaccessible.

11. Cap according to Claim 1 or 10, in which the knob (12) comprises an internal lower transverse closing wall (48) to protect and render inaccessible the internal components of the cap.

Patentansprüche

1. Sicherheitskappe für einen Behälter, der unter Druck stehenden Dampf enthält, die ein Verschlußbauglied (11), das auf die Öffnung (B) des Behälters aufschraubbar ist, einen äußeren Knopf (12), den der Benutzer drehen kann, um das Verschlußbauglied (11) auf- und abzuschrauben, und eine innere Membran (20) aufweist, die durch die Wirkung des Dampfdrucks bewegt wird, wobei die Membran (20), wenn der Dampfdruck niedrig oder null ist, eine Ruheposition, in der das Verschlußbauglied (11) und der Knopf (12) durch ein Kopplungs/Entkopplungs-System (21 - 25) drehgekoppelt sind, um zu ermöglichen, daß die Kappe (10) abgeschraubt wird, und, wenn der Druck hoch ist, eine Betriebsposition, die die Kopplung durch das Kopplungs/Entkopplungs-System (21 - 25) unterbricht und verhindert, daß die Kappe (10) abgeschraubt wird, aufweist, wobei die Kappe (10) **dadurch gekennzeichnet ist, daß** sie ein Manometer (26) aufweist, das in der Kappe untergebracht ist und von außen ablesbar ist, und das den Dampfdruck in dem Behälter unabhängig von dem Betrieb der Membran (20) und des Kopplungs/Entkopplungs-Systems (21 - 25) erfaßt.

2. Sicherheitskappe gemäß Anspruch 1, bei der das Manometer (26) eine Anzeigereinrichtung (39 - 41) aufweist, die durch eine transparente Wand (44) in der Oberseite der Kappe sichtbar ist.

3. Sicherheitskappe gemäß Anspruch 1, bei der das Manometer (26) eine bogenförmige, abgeflachte Rohrkomponente (31) aufweist, die an einem Ende mit einem Rohr (32) in Verbindung steht, das das Drucksignal stromaufwärts bezüglich der Membran (20) aufnimmt, und die an dem anderen Ende über Verbindungen (35 - 38) mit einer Anzeigernadel (39), die an einer Anzeigeskala (40) befestigt ist, verbunden ist, wobei die Rohrkomponente (31) ihre Krümmung als eine Funktion des oben erwähnten Drucksignals verändert und die Anzeigernadel (39) entsprechend bewegt.

4. Sicherheitskappe gemäß Anspruch 3, bei der die Anzeigeskala (40) hinter einer transparenten Wand (44) in der Oberseite des Knopfes (12) befestigt ist.

5. Sicherheitskappe gemäß Anspruch 3 oder 4, bei der die Anzeigeskala (40) eine Skala mit zwei aufeinanderfolgenden Bändern trägt, von denen das erste grün und das nächste rot ist, und entlang derer sich die Anzeigernadel (39) bewegt, wobei das grüne Band für niedrige und Null-Drücke und das rote Band für höhere Drücke vorgesehen ist.

6. Sicherheitskappe gemäß Anspruch 1, bei der die Membran (20) auf eine axiale Buchse (21) wirkt, auf der eine Zahnscheibe (22) aufliegt, die rotationsmäßig durch trennbare Klinkenverbindungen mit dem Verschlußbauglied (11) und dem Knopf (12) verbunden ist, wobei die Zahnscheibe (22) in der Ruheposition der Membran (20) mit dem Verschlußbauglied (11) und dem Knopf (12) in Eingriff steht, um dieselben rotationsmäßig miteinander zu koppeln, während in der Betriebsposition die Membran (20) die Scheibe (22) axial in eine Position der Außereingriffnahme von dem Verschlußbauglied (11) und von dem Knopf (12) bewegt, um dieselben rotationsmäßig voneinander zu entkoppeln.

7. Sicherheitskappe gemäß Anspruch 3, bei der die Membran (20) auf eine axiale Buchse (21) wirkt, auf der eine Zahnscheibe (22) aufliegt, die rotationsmäßig durch trennbare Klinkenverbindungen mit dem Verschlußbauglied (11) und dem Knopf (12) verbunden ist, wobei die Zahnscheibe (22) in der Ruheposition der Membran (20) mit dem Verschlußbauglied (11) und dem Knopf (12) in Eingriff steht, um dieselben rotationsmäßig miteinander zu koppeln, während in der Betriebsposition die Membran (20) die Scheibe (22) axial in eine Position der Außereingriffnahme von dem Verschlußbauglied (11) und von dem Knopf (12) bewegt, um dieselben rotationsmäßig voneinander zu entkoppeln, und bei der das Rohr (32) axial durch ein Loch (29) in der Scheibe (22) und durch das Innere (30) der Buchse (21) läuft, transversal aus der Buchse (21) heraus durch einen longitudinalen Schlitz (33) in der Buchse (21) verläuft und durch ein transversales Loch (34) in dem Verschlußbauglied (11), das sich stromaufwärts bezüglich der Membran (20) öffnet, wieder eintritt.

8. Kappe gemäß Anspruch 1, bei der das Verschlußbauglied (11) einen mit einem Gewinde versehenen Schaft (14) auf-weist, der auf die Öffnung (B) des Behälters aufschraubbar ist und mit-

tels einer Lüftungsöffnung in einer Zwischenposition ein Durchgangsloch (46) umfaßt.

9. Kappe gemäß Anspruch 1, bei der das Verschlußbauglied (11) stromaufwärts bezüglich der Membran (20) mit einer Wand (18) versehen ist, die ein exzentrisches Loch (19) zum Durchlaß des Dampfes enthält, und bei der das Verschlußbauglied (11) eine Dichtung (45) aufnimmt, die eine Leckdichtheit zwischen dem Verschlußbauglied (11) und der Behälteröffnung (B) liefert und sich radial in Richtung der Mitte der Öffnung (B) erstreckt, derart, daß sich dieselbe zumindest teilweise über dem exzentrischen Loch (19) befindet.

10. Kappe gemäß Anspruch 1, bei der der Knopf (12) eine Einfassung (47), die sich nach unten zumindest bis zu dem unteren Ende des Verschlußbauglieds (11) erstreckt, aufweist, um die inneren Komponenten der Kappe zu schützen und das Verschlußbauglied (11) lateral unzugänglich zu machen.

11. Kappe gemäß Anspruch 1 oder 10, bei der der Knopf (12) eine innere, untere, transversale Verschlußwand (48) aufweist, um die inneren Komponenten der Kappe zu schützen und dieselben unzugänglich zu machen.

Revendications

1. Bouchon de sécurité pour récipient contenant de la vapeur d'eau sous pression, comprenant un élément de fermeture (11) vissé sur l'orifice (B) du récipient, un bouton externe (12) que l'utilisateur peut tourner pour visser l'élément de fermeture (11) et le dévisser, et un diaphragme interne (20) qui est déplacé par l'action de la pression de la vapeur d'eau, le diaphragme (20) ayant une position de repos lorsque la pression de vapeur est faible ou nulle, à laquelle l'élément de fermeture (11) et le bouton (12) sont couplés en rotation par l'intermédiaire d'un système de couplage/découplage (21-25) pour permettre de dévisser le bouchon (10), et une position de fonctionnement, lorsque la pression est élevée, qui interrompt ce couplage par l'intermédiaire du système de couplage/découplage (21-25) et empêche le bouchon (10) d'être dévissé, lequel bouchon (10) est **caractérisé en ce qu'**il comprend un manomètre (26), intégré au bouchon et lisible de l'extérieur, qui détecte la pression de la vapeur d'eau dans le récipient indépendamment du fonctionnement du diaphragme (20) et du système de couplage/découplage (21-25).

2. Bouchon de sécurité selon la revendication 1, dans lequel le manomètre (26) comprend des moyens indicateurs (39-41) visibles à travers une paroi transparente (44) dans la partie supérieure du bouchon.

3. Bouchon de sécurité selon la revendication 1, dans lequel le manomètre (26) comprend un composant tubulaire aplati et incurvé (31) communiquant par une extrémité avec un tube (32) qui capte le signal de pression en amont du diaphragme (20) et qui est raccordé par l'autre extrémité par l'intermédiaire de mécanismes de liaison (35-38) à une aiguille indicatrice (39) montée sur un cadran (40), le composant tubulaire (31) ayant une courbure variable qui est fonction du signal de pression mentionné précédemment et déplaçant de façon correspondante l'aiguille indicatrice (39).

4. Bouchon de sécurité selon la revendication 3, dans lequel le cadran (40) est monté derrière une paroi transparente (44) dans la partie supérieure du bouton (12).

5. Bouchon de sécurité selon la revendication 3 ou 4, dans lequel le cadran (40) porte une échelle ayant deux bandes consécutives, la première étant verte et la suivante, rouge, le long desquelles se déplace l'aiguille indicatrice (39), la bande verte étant destinée à des pression nulles ou faibles, et la bande rouge, à des pressions plus élevées.

6. Bouchon de sécurité selon la revendication 1, dans lequel le diaphragme (20) agit sur un manchon axial (21) sur lequel repose un disque denté (22) relié en rotation par des raccordements à griffes séparables à l'élément de fermeture (11) et au bouton (12), lequel disque denté (22) vient en prise, dans la position de repos du diaphragme (20), avec l'élément de fermeture (11) et le bouton (12) afin de les coupler l'un à l'autre en rotation, alors que dans la position de fonctionnement, le diaphragme (20) déplace le disque (22) axialement jusqu'à une position de dégagement d'avec l'élément de fermeture (11) et d'avec le bouton (12) afin de les découpler en rotation l'un de l'autre.

7. Bouchon de sécurité selon la revendication 3, dans lequel le diaphragme (20) agit sur un manchon axial (21) sur lequel repose un disque denté (22) relié en rotation par des raccordements à griffes séparables à l'élément de fermeture (11) et au bouton (12), lequel disque denté (22) vient en prise, dans la position de repos du diaphragme (20), avec l'élément de fermeture (11) et le bouton (12) afin de les coupler l'un à l'autre en rotation, alors que, dans la position de fonctionnement, le diaphragme (20) déplace le disque (22) axialement jusqu'à une position de dégagement d'avec l'élément de fermeture (11) et d'avec le bouton (12) afin de les découpler en rotation l'un de l'autre, et dans lequel le tube (32)

se déplace axialement à travers un trou (29) pratiqué dans le disque (22) et à travers l'intérieur (30) du manchon (21), se déplace transversalement pour sortir du manchon (21) à travers une fente longitudinale (33) pratiquée dans le manchon (21), et pénètre de nouveau à travers un trou transversal (34) pratiqué dans l'élément de fermeture (11) qui s'ouvre en amont du diaphragme (20).

8. Bouchon selon la revendication 1, dans lequel l'élément de fermeture (11) présente une tige filetée (14) qui se visse sur l'orifice (B) du récipient et qui comporte un trou traversant (46) jouant le rôle d'évent en position intermédiaire.

9. Bouchon selon la revendication 1, dans lequel l'élément de fermeture (11) est muni, en amont du diaphragme (20), d'une paroi (18) contenant un trou excentrique (19) permettant le passage à travers celui-ci de la vapeur d'eau, et dans lequel l'élément de fermeture (11) peut recevoir un joint d'étanchéité (45) qui assure l'étanchéité contre les fuites entre l'élément de fermeture (11) et l'orifice (B) du récipient et qui fait saillie radialement vers le milieu de l'orifice (B) de façon à venir au moins partiellement au-dessus du trou excentrique (19).

10. Bouchon selon la revendication 1, dans lequel le bouton (12) comprend une collerette (47) qui descend au moins jusqu'à l'extrémité inférieure de l'élément de fermeture (11), pour la protection des éléments constitutifs internes du bouchon et pour rendre l'élément de fermeture (11) latéralement inaccessible.

11. Bouchon selon la revendication 1 ou 10, dans lequel le bouton (12) comprend une paroi de fermeture transversale inférieure interne (48) permettant de protéger et de rendre inaccessibles les éléments constitutifs internes du bouchon.

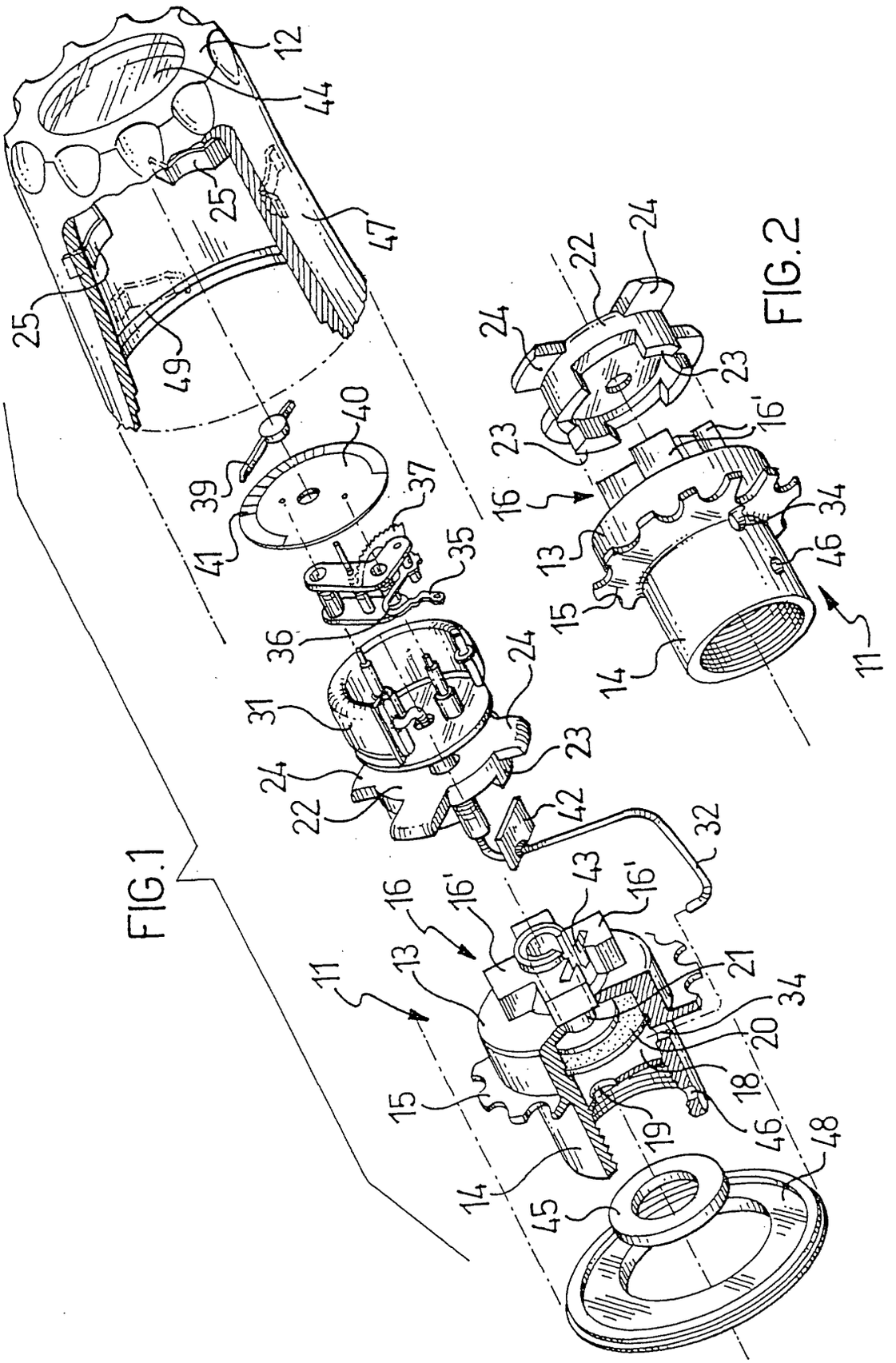
12
44
25
47
25
49
40
39
37
41
35
36
24
31
23
24
22
42
32
43
16
16'
16'
13
11
21
34
20
15
18
19
46
14
45
48
24
22
24
23
16'
23
16
34
13
46
15
14
11

FIG.1

FIG.2

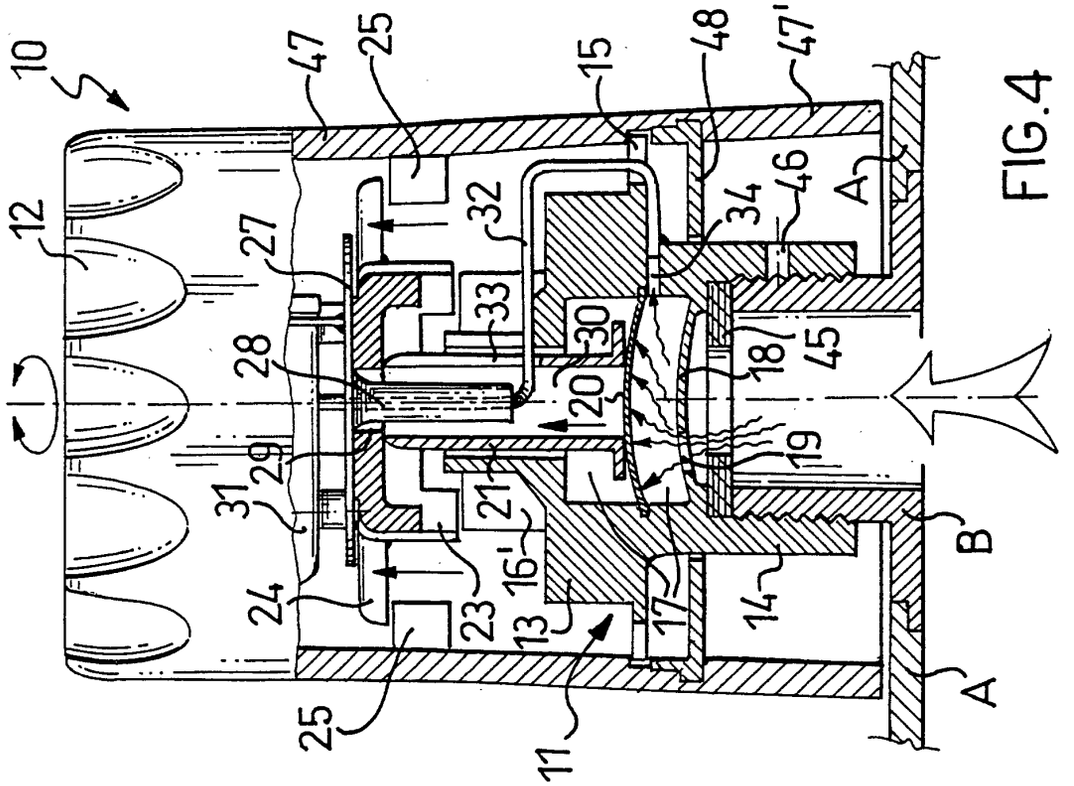
10
12
47
25
15
48
47'
27
32
34
46
A
28
33
30
18
45
20
29
19
31
21
16'
B
24
23
13
17
14
25
11
A

FIG.4

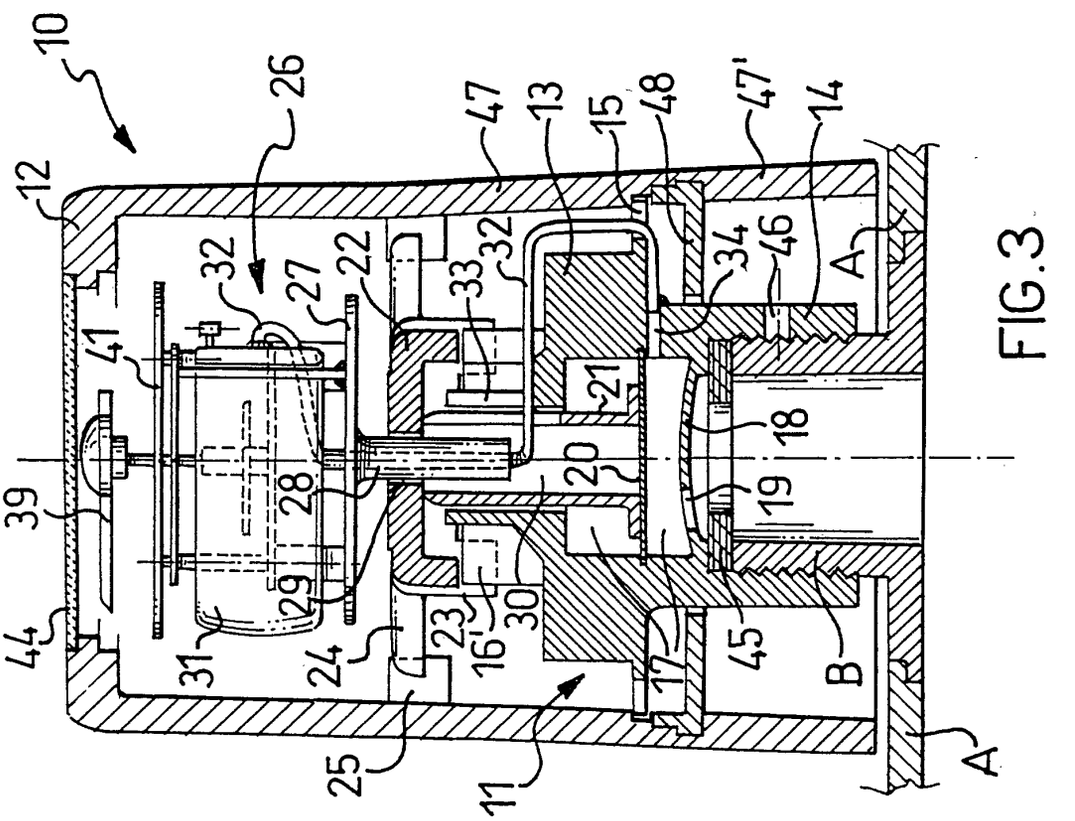
10
26
47
13
15
48
47'
14
12
32
27
22
33
32
34
46
A
41
21
18
20
39
28
19
29
30
23
16'
45
B
44
31
24
17
25
11
A

FIG.3

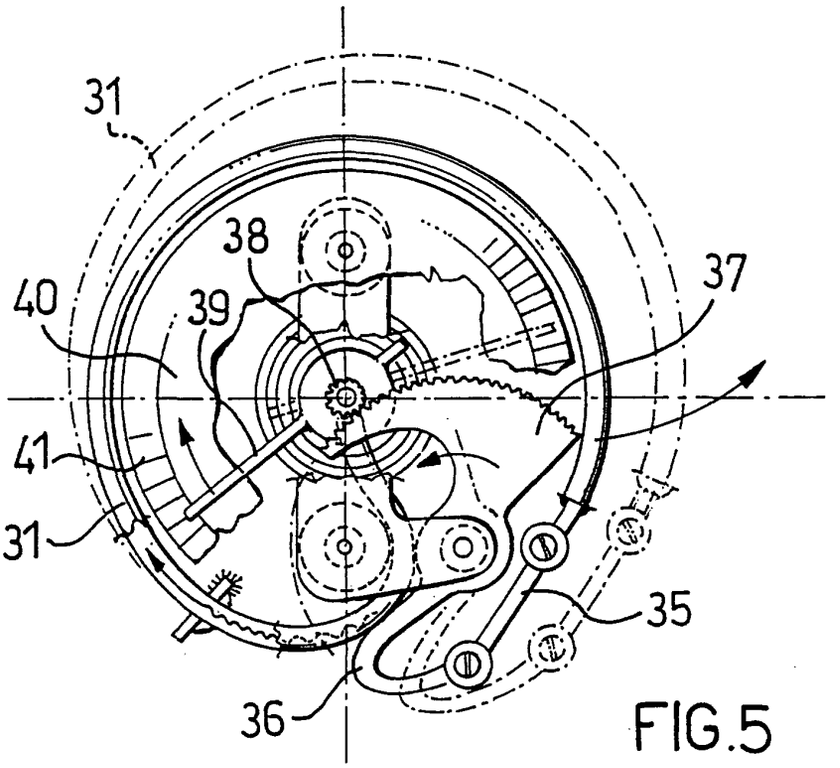

FIG.5

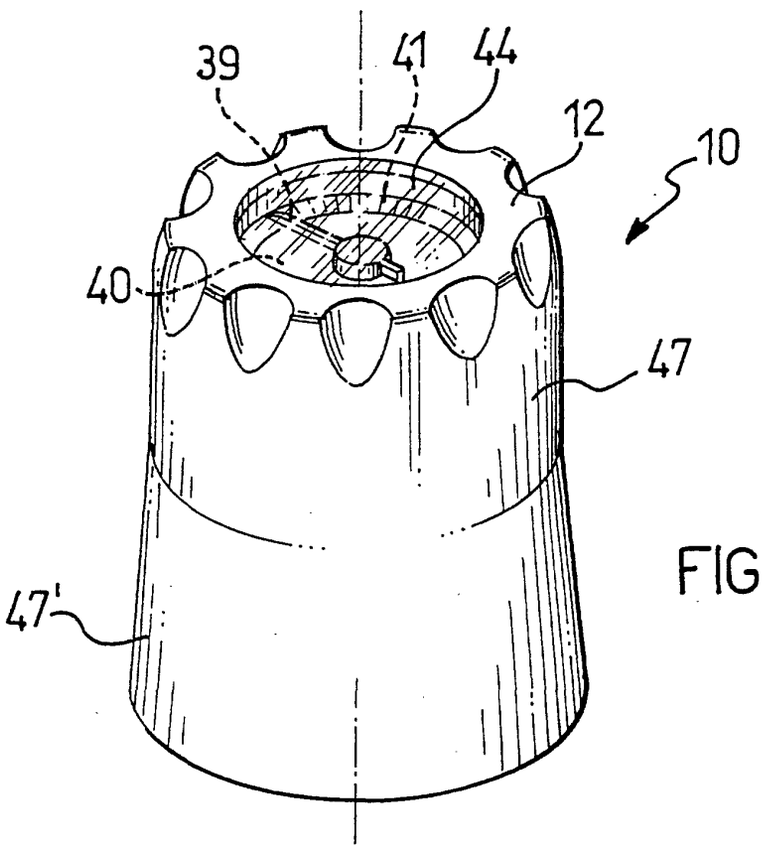

FIG.6